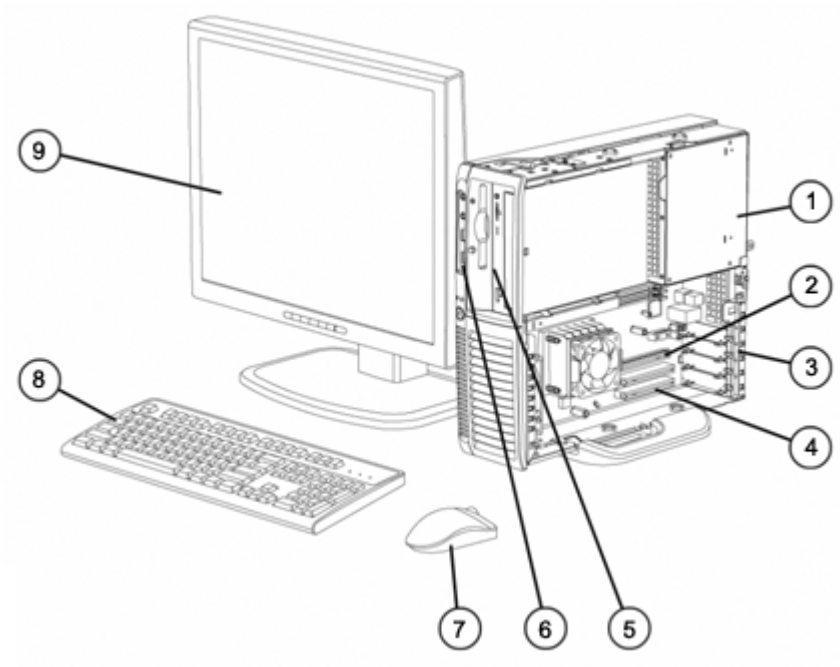
Overview

HP recommends
Windows Vista™ Business

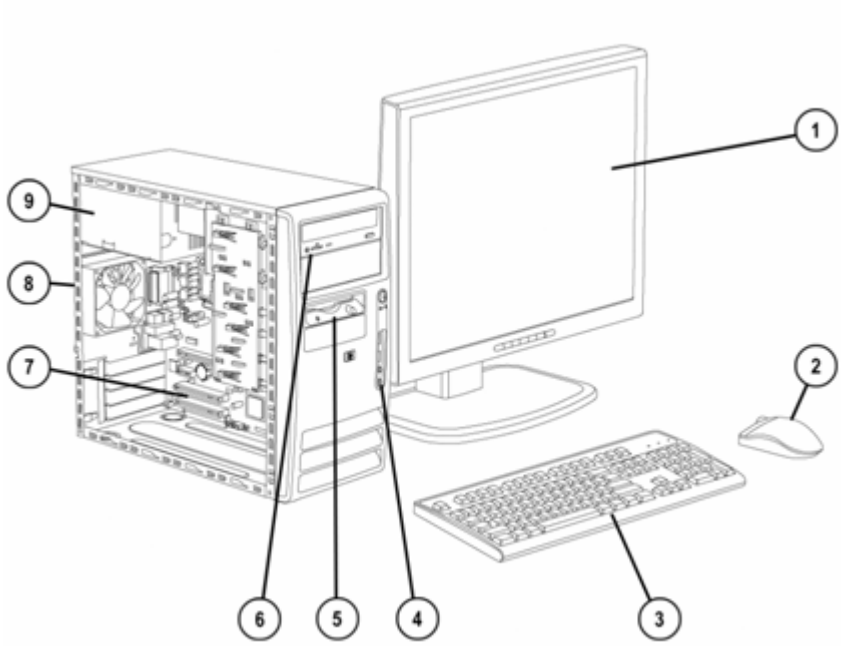
Slim Tower



1. 240-watt power supply
2. 1 Low Profile PCI Express x16 slot, 1 low profile PCI Express x1 slot
3. 6 USB 2.0, 1 standard serial port, 1 parallel port, 2 PS/2, 1 RJ-45, 1 VGA, audio in/out
4. 2 low profile PCI slots
5. 1 – 3.5" internal bay, 1 – 5.25" external bay, and 1 – 3.5" external bay for optional diskette drive, 16-in-1 Media Card Reader, or other 3.5" device
6. Front I/O: 2 USB 2.0, headphone and microphone
7. 2-Button Scroll Mouse
8. HP Standard Keyboard
9. Monitor (sold separately)

Overview

Microtower



1. Monitor (sold separately)
2. 2-Button Scroll Mouse
3. HP Standard Keyboard
4. Front I/O: 2 USB 2.0, headphone and microphone
5. 2 – 3.5" external bays for optional diskette drive, 16-in-1 Media Card Reader, or other 3.5" device
6. 2 – 5.25" external bays, and 2 internal 3.5" bays
7. 2 full-height PCI slots, 1 full height PCI Express x1 slot, 1 full height PCI Express x16 slot
8. 6 USB 2.0, 1 standard serial port, 1 parallel port, 2 PS/2, 1 RJ-45, 1 VGA, audio in/out
9. 300-watt power supply

At A Glance

- Choice of operating systems:
  Genuine Windows XP Professional
  Genuine Windows XP Home
  SuSE Linux Personal 9.2 OEM (delivered on CDs with system, not pre-installed)
- Intel® Pentium® 4 Processor with HT Technology and Celeron D processors
- Intel 915G Express chipset with Integrated Intel Graphics Media Accelerator 900
- DDR2 Synch DRAM PC2-3200 (DDR400) Memory
- Integrated Broadcom NetXtreme Gigabit PCI-E ethernet
- Dual Channel Memory with 4 available color coded DIMM slots
- Serial ATA Hard Drives
- Support for PCI Express
- SoundMax Digital AC97 Integrated Audio with internal speaker
- Color coded cables for ease of use
- Basic serviceability with tool-less covers and drives
- Energy Star compliance with energy-saving features
- Protected by HP Services, including a 3-1-1, standard warranty. Terms and conditions vary by country. Certain restrictions and exclusions apply.

Overview

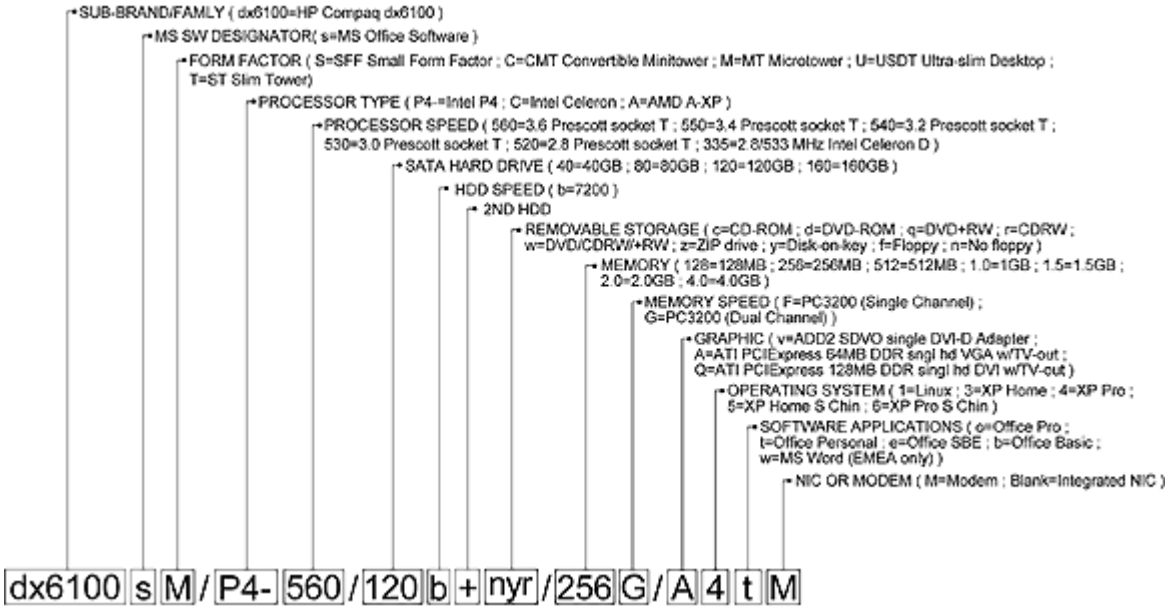
[1] The Hyper-Threading feature is a new technology designed to improve performance of multi-threaded software products; please contact your software provider to determine software compatibility. Not all customers or software applications will benefit from the use of Hyper-Threading technology. Visit http://www.intel.com/info/hyperthreading/ for more information.

Standard Features - Select Models (localized by Regions)

HP Compaq Business Desktop dx6120 Series

Model Key and Example

NOTE: This diagram is an example that illustrates how to read the model number.
It is not intended to give every available configuration choice specified in the body of this document and may include references to modules that are out of date and no longer available.


SUB-BRAND/FAMLY (dx6100=HP Compaq dx6100)
MS SW DESIGNATOR(s=MS Office Software)
FORM FACTOR (S=SFF Small Form Factor ; C=CMT Convertible Minitower ; M=MT Microtower ; U=USDT Ultra-slim Desktop ; T=ST Slim Tower)
PROCESSOR TYPE (P4-=Intel P4 ; C=Intel Celeron ; A=AMD A-XP)
PROCESSOR SPEED (560=3.6 Prescott socket T ; 550=3.4 Prescott socket T ; 540=3.2 Prescott socket T ; 530=3.0 Prescott socket T ; 520=2.8 Prescott socket T ; 335=2.8/533 MHz Intel Celeron D)
SATA HARD DRIVE (40=40GB ; 80=80GB ; 120=120GB ; 160=160GB)
HDD SPEED (b=7200)
2ND HDD
REMOVABLE STORAGE (c=CD-ROM ; d=DVD-ROM ; q=DVD+RW ; r=CDRW ; w=DVD/CDRW/+RW ; z=ZIP drive ; y=Disk-on-key ; f=Floppy ; n=No floppy)
MEMORY (128=128MB ; 256=256MB ; 512=512MB ; 1.0=1GB ; 1.5=1.5GB ; 2.0=2.0GB ; 4.0=4.0GB)
MEMORY SPEED (F=PC3200 (Single Channel) ; G=PC3200 (Dual Channel))
GRAPHIC (v=ADD2 SDVO single DVI-D Adapter ; A=ATI PCIExpress 64MB DDR sngl hd VGA w/TV-out ; Q=ATI PCIExpress 128MB DDR sngl hd DVI w/TV-out)
OPERATING SYSTEM (1=Linux ; 3=XP Home ; 4=XP Pro ; 5=XP Home S Chin ; 6=XP Pro S Chin)
SOFTWARE APPLICATIONS (o=Office Pro ; t=Office Personal ; e=Office SBE ; b=Office Basic ; w=MS Word (EMEA only))
NIC OR MODEM (M=Modem ; Blank=Integrated NIC)
dx6100 s M / P4- 560 / 120 b + nyr / 256 G / A 4 t M

Standard Features - Custom Components

		Slim Tower	Microtower
Processor and Speed* – One of the following	**Intel Celeron D Processors** (when they become available)		
	Intel Celeron D 331 Processor (2.66-GHz, 256K L2 cache, 533-MHz FSB)	X	X
	Intel Celeron D 351 Processor (3.2-GHz, 256K L2 cache, 533-MHz FSB)	X	X
	Intel Celeron D 356 Processor (3.3-GHz, 512K L2 cache, 533-MHz FSB)	X	X
	Intel Pentium 4 Processors with Hyper-Thread Technology		
	Intel Pentium 4 521 Processor (2.8-GHz, 1-MB L2 cache, 800-MHz FSB)	X	X
	Intel Pentium 4 524 Processor (3.06-GHz, 1-MB L2 cache, 800-MHz FSB)		X
	Intel Pentium 4 541 Processor (3.26-GHz, 1-MB L2 cache, 800-MHz FSB)		X
	Intel Pentium 4 620 Processor (2.8-GHz, 2-MB L2 cache, 800-MHz FSB)	X	X
	Intel Pentium 4 630 Processor (3.0-GHz, 2-MB L2 cache, 800-MHz FSB)	X	X
	Intel Pentium 4 640 Processor (3.2-GHz, 2-MB L2 cache, 800-MHz FSB)	X	X
	Intel Pentium 4 650 Processor (3.4-GHz, 2-MB L2 cache, 800-MHz FSB)	X	X
	Intel Pentium 4 660 Processor (3.6-GHz, 2-MB L2 cache, 800-MHz FSB)	X	
	Intel Pentium 4 670 Processor (3.8-GHz, 2-MB L2 cache, 800-MHz FSB)	X	

***NOTE**: Intel processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families. Not all processors are available in all regions or on all models.

Operating System (one of the following)	Genuine Windows XP Professional SP2	X	X
	Genuine Windows XP Home with SP2	X	X
	SuSE Linux Personal 9.2 OEM (delivered on CDs with system, not pre-installed)	X	X
	FreeDOS	X	X
	Turbo Linux 10D (delivered on CDs with system, not pre-installed) – China only	X	X

Standard Features - Custom Components

Hard Disk Drive – One of the following	**Serial ATA SMART III Hard Drives**		
	40-GB SATA 1.5-Gb/s Hard Drive	X	X
	80-GB SATA 1.5-Gb/s Hard Drive	X	X
	160-GB SATA 1.5-Gb/s Hard Drive	X	X
	250-GB Serial ATA 1.5-Gb/s Hard Drive (7200 rpm)	X	X
	2nd hard drive, 40-GB SATA 1.5-Gb/s Hard Drive	X	X
	2nd hard drive, 80-GB SATA 1.5-Gb/s Hard Drive	X	X
	2nd hard drive, 160-GB SATA 1.5-Gb/s Hard Drive	X	X
	2nd hard drive, 250-GB Serial ATA 1.5-Gb/s Hard Drive (7200 rpm)	X	X
Memory – One of the following, available in both PC2-3200 (400 MHz) and PC2-4200 (533 MHz)	256-MB DDR2 Synch DRAM Non ECC (2 x 128)	X	X
	512-MB DDR2 Synch DRAM Non ECC (1 x 512)	X	X
	512-MB DDR2 Synch DRAM Non ECC (2 x 256)	X	X
	1-GB DDR2 Synch DRAM Non ECC (2 x 512)	X	X
	1-GB DDR2 Synch DRAM Non ECC (1x 1GB)	X	X
	2-GB DDR2 Synch DRAM Non ECC (4 x 512)	X	X
	2-GB DDR2 Synch DRAM Non ECC (2x 1GB)	X	X
	4-GB DDR2 Synch DRAM Non ECC (4x 1GB)	X	X
Storage – One of the following	**Diskette and Zip Drives**		
	Optional 1.44-MB Floppy Diskette Drive	X	X
	Zip 250 for 3.5" drive bay	X	N/A
	Zip 250 for 5.25" drive bay	N/A	X
	Media Reader		
	HP 16-in-1 Media Reader (PCI card supplies internal USB connection)	X	X
	Optical Drives		
	48X CD-ROM Drive	X	X
	52X CD-ROM Drive – APJ only	X	X
	48X/32X/48X CD-RW Drive	X	X
	48X/32X/48X/16X Combo CD-RW/DVD-ROM Drive	X	X
	16X/40X DVD-ROM Drive	X	X
	16X/48X DVD-ROM Drive	X	X
	16X DVD+/- RW Drive	X	X
	16X DVD+/-RW DL Drive (LightScribe/Double Layer/Dual Format)	X	X
Keyboard – One of the following	HP PS/2 Standard Keyboard	X	X
	HP USB Standard Keyboard	X	X
	HP USB Smartcard Keyboard	X	X

Standard Features - Custom Components

Mouse – One of the following	PS/2 2-Button Scroll Mouse	X	X
	PS/2 2-Button Optical Scroll Mouse	X	X
	USB 2-Button Optical Mouse	X	X
	USB 2-Button Scroll Mouse	X	X
Modem	Agere PCI 56K low profile International Softmodem	X	X
Audio	Integrated ADI 1981B AC97 Audio with Internal Speaker	X	X
NIC	Integrated Broadcom BCM 5782 NetXtreme Gigabit ethernet	X	X
	Intel Pro 1000 MT Gigabit NIC full height PCI	N/A	X
	Intel Pro 1000 MT Gigabit NIC low profile PCI	X	N/A
Graphics (one of the following)	Integrated Intel Graphics Media Accelerator 900 graphics	X	X
	DVI ADD2 adapter for Micro Tower (MT) chassis Normal Pinout	N/A	X
	DVI ADD2 adapter Slim Tower (ST) chassis, Reversed Pinout	X	N/A
	NVIDIA Quadro NVS 280 PCI 64-MB Dual Head (full height)	N/A	X
	NVIDIA Quadro NVS 280 PCI 64-MB Dual Head (low profile)	X	N/A
	ATI Radeon X300SE PCIExpress 128-MB DDR singlehead DVI with TV-out and full height bracket	N/A	X
	ATI Radeon X300SE PCIExpress 128-MB DDR singlehead DVI with TV-out and low profile bracket	X	N/A
	ATI Radeon X1300 256MB DDR LP PCIE DVI w/TV-out	X	X
Security	Rear Port Control Cover	X	X

Standard Features - Custom Components

Software	Norton Antivirus 2005 with 60 day Live Update Subscription	X	X
	Altiris Local Recovery back up software preloaded	X	X
	Microsoft Office 2003 Professional	X	X
	Microsoft Office 2003 Small Business Edition	X	X
	Microsoft Office 2003 Personal	X	X
	Microsoft Office 2003 Basic	X	X
	Microsoft Works 8.5	X	X
	Microsoft Internet Explorer with Google Toolbar	X	X
	WinDVD (with DVD-ROM, Combo, and DVD+/- RW drives)	X	X
	WinDVD Creator (with DVD +/- RW Drives)	X	X
	Roxio Easy CD & DVD Creator (with CD-RW, Combo, and DVD+/- RW drives)	X	X
	Dantz Retrospect Backup Express (with CD-RW, Combo, and DVD+/- RW drives)	X	X
	NOTE: For information about Intelligent Manageability visit: http://h18000.www1.hp.com/im.		
	NOTE: Microsoft Office XP Small Business and Microsoft Office Professional not available in all countries.		
	NOTE: Norton AntiVirus includes FREE 60 day live update subscription.		
Miscellaneous	HP FireWire / IEEE 1394 PCI Card (full height)	N/A	X
	HP FireWire / IEEE 1394 PCI Card (low profile)	X	N/A
	Tower stand	X	N/A

Standard Features

	Slim Tower	Microtower
Operating System (Choice)		
Genuine Windows XP Professional SP2	X	X
Genuine Windows XP Home SP2	X	X
Processor	Intel Pentium 4 and Intel Celeron processors	
CPU Bus Speed Supported	800-MHz or 533-MHz FSB, depending on processor	
Standard L2 Cache	256 or 1024-KB	
Chipset	Intel 915G	
Memory Expansion Slots	4 DIMMs	4 DIMMs
Memory Type Supported	Non-ECC DDR Synch Dram (ECC not supported by Chipset)	
Memory Speed Supported	DDR2 Synch DRAM PC3200 (400MHz) non-ECC	
Maximum Memory	4-GB **NOTE:** With the 915G chipset, some addressable memory gets reserved for the system components and for devices that are added to the system (such as PCIE graphics cards). This will reduce the total addressable memory available for applications to less than 4GB, depending on the number and type of devices that are added.	
Network controller	Integrated Broadcom BCM 5782 NetXtreme Gigabit ethernet for HP	
Graphics	Intel Graphics Media Accelerator 900	
Audio	Integrated Digital Audio with SPDif 6-channel pass-through, Stereo Microphone, Active Noise Cancellation and Yamaha XG Lite Softsynth support	
Expandability		
PCI slots	2 low-profile	2 full length, full height
PCI Express x16 slot	1 low profile (Reverse Pinout)	1 full height (Normal Pinout)
PCI Express x1 slot	1 low profile (2.5"), length (6.6")	1 full-height (4.2"), length (13.4")
AGP slot	none	none
Bays	Total Bays = 3	Total Bays = 6
External Bays	(1) full-length 5.25" (1) full-length 3.5"	(2) full-length 5.25" (2) full-length 3.5"
Internal Bays	(1) internal hard drive bay (2nd HDD bay via external 3.5" bay)	(2) 3.5 inch hard drive bays
Wireless Support	PCI card or external USB	
IDE	2 IDE connectors for opticals	
Serial-ATA	2 serial-ATA connectors for SATA hard drives	

Standard Features

Ports		
USB 2.0	8 (2 front, 6 rear)	
Serial	1 standard	
Parallel	1	
PS/2	1 keyboard, 1 mouse	
Video	analog for integrated graphics	
DVI output	available via ADD2 Card, PCI-E x16, and PCI card	
Support for Multi-Monitor	available via ADD2 Card, PCI-E x16, and PCI card	
Audio	Front – mic and headphone	
	Rear – line in, line out, mic input	
NIC	Integrated Broadcom Gigabit	
Dimensions		
Chassis Dimensions (H x W x D) cenitmeters	33.78 x 10.03 x 37.85	36.6 x 17.5 x 42
Chassis Dimensions (H x W x D) inches	13.3 x 3.95 x 14.9	14.4 x 6.88 x 16.55
System weight	20.0 lb (9.07 kg)	24.0 lb (10.89 kg)
System volume	782.7 sq. in. (12.8 liters)	1640 sq. in. (27.0 liters)
Shipping weight	30 lb (13.61 kg)	34 lb (15.42 kg)
Shipping Box Size	20.00 x 18.75 x 12.63 in (50.8 x 47.63 x 32.08 cm)	22.25 x 19.63 x 15.13 in (56.52 x 49.86 x 38.43 cm)
Power Supply	240-watt active PFC	300-watt passive PFC (user selectable 115V/230V)
Hard Drive Interfaces Supported	2 Serial ATA interfaces	2 Serial ATA interfaces
Hard Drive Controller (PCI) Supported	Serial ATA	Serial ATA
Optical/Removable Storage Interface Supported	1 Ultra ATA/100 interface (supporting 2 devices)	1 Ultra ATA/100 interface (supporting 2 devices)
Optical/Removable Controller (PCI) Supported	Ultra ATA/100	Ultra ATA/100
Preinstalled Software		
Computer Setup Utility	X	X
Diagnostics for Windows	X	X
Microsoft Internet Explorer	X	X

After-Market Options

		ST	M	Part Number
Communications	**Wireless LAN**			
	HP BT450 USB Bluetooth Wireless Printer and PC Adapter	X	X	IPQ639A
	HP Wireless A+G PCI Adapter (WW except North America)	X	X	PZ928AA
	NICs			
	Broadcom NetXtreme Gigabit Ethernet PCI Adapter	X	X	DC194A
	Intel Pro/1000 MT Gigabit Ethernet PCI Adapter (full height only)	--	X	DC193A
	Intel Pro/1000 MT Gigabit Ethernet PCI Adapter (low profile only)	X	--	DC193B
	Intel PRO/1000 GT Gigabit PCI (full height only)	--	X	AG393AA
	Modem			
	Agere PCI 56K International SoftModem	X	X	EK694AA
Graphics	**Single-head solutions**			
	DVI-D ADD2 adapter, normal pinout	--	X	DY674A
	DVI-D ADD2 adapter, reverse pinout	X	--	DY673A
	ATI RADEON X300SE PCIExpress 128-MB DDR singlehead DVI with TV out	X	X	DY596A
	ATI RADEON X1300 256-MB DDR PCIE DVI with TV out	X	X	AG392AA
	Multi-head solutions			
	Dual DVI Y-cable for DY599A or DY650A	X	X	DC194A
Hard Drives	**Serial ATA SMART III Hard Drives**			
	40-GB SATA 1.5-Gb/s Hard Drive	X	X	PB371A
	80-GB SATA 1.5-Gb/s Hard Drive	X	X	DE705A
	160-GB SATA 1.5-Gb/s Hard Drive	X	X	DE706A
Input/Output Devices	**Keyboards**			
	HP PS/2 Standard Keyboard	X	X	DT527A
	HP USB Standard Keyboard	X	X	DT528A
	HP USB Smartcard Keyboard	X	X	ED707AA
	Pointing Devices			
	HP Bluetooth Optical Mouse (included in DT532A)	X	X	PA720A
	HP PS/2 2-Button Scroll Mouse (Carbonite)	X	X	DD440B
	HP PS/2 2-Button Optical Scroll Mouse	X	X	EY703AA
	HP USB 2-Button Scroll Mouse (Carbonite)	X	X	DD441B
	HP USB 2-Button Optical Scroll Mouse (Carbonite/Silver)	X	X	DC172B

After-Market Options

Memory (DIMMs)	**PC2-3200 (DDR2-400) DIMMs Non-ECC**			
	256MB PC2-3200 (DDR2 400MHz) DIMM	X	X	PR661A
	512MB PC2-3200 (DDR2 400MHz) DIMM	X	X	PR662A
	1GB PC2-3200 (DDR2 400MHz) DIMM	X	X	PR663A
	2GB PC2-3200 (DDR2 400MHz) DIMM	X	X	PR664A
	PC2-4200 (DDR2-533) DIMMs Non-ECC			
	256MB PC2-4200 (DDR2 533MHz) DIMM	X	X	PV558AA
	512MB PC2-4200 (DDR2 533MHz) DIMM	X	X	PV560AA
	1GB PC2-4200 (DDR2 533MHz) DIMM	X	X	PV557AA
	2GB PC2-4200 (DDR2 533MHz) DIMM	X	X	PV559AA
Monitors	**CRTs**			
	HP s7540 17" (16.0" vis) CRT Monitor			PF997AA#XXX
	HP v7650 17" (16.0" vis) Flat-face CRT Monitor			PF996AA#XXX
	TFTs			
	HP L1506 15" TFT Flat Panel Monitor – Analog only			PX848AA#XXX
	HP L1706 17" TFT Flat Panel Monitor – Analog only			PX849AA#XXX
	HP L1740 17" TFT Flat Panel Display – Analog/Digital			PL766AA#XXX
	HP L1755 17" TFT Flat Panel Display – Analog/Digital			PL777AA#XXX
	HP L1906 19" TFT Flat Panel Display – Analog only			PX850AA#XXX
	HP L1940T 19" TFT Flat Panel Display – Analog/Digital			EM869AA#XXX
	HP L1955 19" TFT Flat Panel Display – Analog/Digital			PD974AA#XXX
	HP L2065 20" TFT Flat Panel Display – Analog/Digital			EF227A4#XXX
	HP LP2465 24" TFT Widescreen Flat Panel Display – Analog/Digital			EF224A4#XXX
	GSA Monitors			
	HP L717g 17" GSA Flat Panel Monitor			EE191AA#XXX
	HP L919g 19" GSA Flat Panel Monitor			EE192AA#XXX
	Options			
	HP Flat Panel Speaker Bar			EE418AA
	HP CRT Monitor Multimedia Base			PM552AA
Multimedia	Harman/Kardon Satellite speaker pair (EMEA only)	X	X	DL983A
	JBL Platinum Series Speakers – Carbonite	X	X	DE893B
	HP Desktop Access Center	X	X	DK985A
	Logitech Axis202 PC Headset (analog, no mute)	X	X	DE640A
	HP 16-in-1 Media Card Reader with PCI Card	X	X	EM718AA

After-Market Options

Optical Drives	**DVD-ROM Drive**			
	16X/40X DVD-ROM Drive	X	X	DC151B
	16X/48X DVD-ROM Drive	X	X	PR596A
	CD-ROM Drive			
	48X Max CD-ROM Drive	X	X	DC143B
	CD-RW Drive			
	48X/32X/48X CD-RW Drive	X	X	DL975B
	Combo Drive			
	48X/32X Combo DVD-ROM/CD-RW Drive	X	X	DL976B
	DVD+R/+RW Drive			
	16X DVD+/- RW Drive	X	X	PN417A
	16X DVD+/-RW LightScribe Drive (Double Layer/Dual Format)	X	X	PR595A
Removable Storage	**Drive Key Options**			
	256-MB HP Drive Key II (USB 2.0)	X	X	PH657A
	512-MB HP Drive Key II (USB 2.0)	X	X	ED516AA
	1-GB HP Drive Key II (USB 2.0)	X	X	AG382AA
	Diskette and Digital Drives			
	1.44-MB USB Diskette Drive – External (Carbonite)	X	X	DC141B
	1.44-MB Internal Diskette Drive	X	X	DS710B
	Zip Drives and Media			
	Zip 250 Drive (Carbonite)	X	X	DC140B
	Zip 750 Drive (Carbonite)	X	X	DC518B
Security	Security cable with Kensington lock	X	X	DC368A
	Chassis clamp lock, universal, no cable	X	X	DE817A
	HP Business PC Security Lock Kit	X	X	EV265AA

After-Market Options

Software	HP Client Foundation Suite Includes: HP Client Manager HP Systems Insight Manager Connector Altiris Local Recovery Pro Altiris Migration Suite	X	X	EF117AA (use EF118AA for 1000+ licenses)
	HP Client Premium Suite Includes: HP Client Manager HP Systems Insight Manager Connector Altiris Local Recovery Pro Altiris Migration Suite Altiris Connector Solution Altiris Client Management Suite Level 1 HP OpenView Connector	X	X	EF119AA (use EF120AA for 1000+ licenses)
Miscellaneous Accessories	HP FireWire / IEEE 1394 PCI Card	X	X	PA997A

Memory

915G Express chipset

DDR SYNCH DRAM NON-ECC MEMORY

It is not necessary to add memory in pairs. Memory upgrades are accomplished by adding single or multiple DIMMs of the same or varied sizes. This chart does not represent all possible memory configurations. The Intel 915G Express chipset supports PC2-3200 (DDR2 400-MHz) non-ECC and DDR2 PC4200 (533-MHz) non-ECC memory.

For best performance, add in pairs, add in same channel, and do not mix speeds. For dual-channel performance, the total amount of memory in each channel should be equal. If speeds are mixed, speed will default to the slowest DIMM.

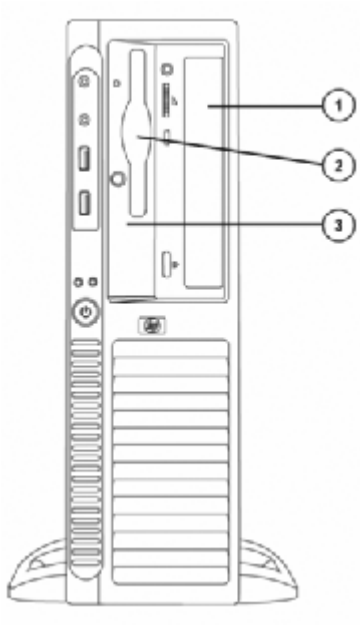
MAXIMUM MEMORY (SLIM TOWER AND MICROTOWER)

Supports up to 4-GB of DDR2 SYNCH DRAM. *Above 3-GB, all memory may not be available due to system resource requirements. Not all memory configurations possible are represented below.*

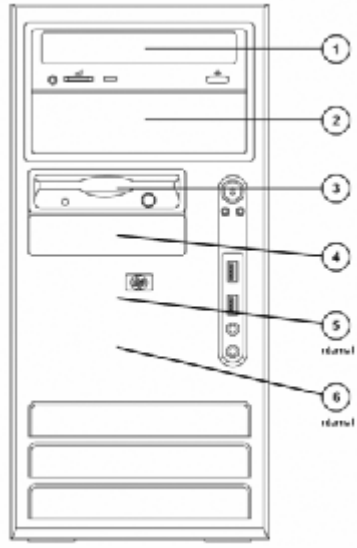
DIMM Size	Slot			
	Channel A		Channel B	
	1	2	3	4
128-MB	128-MB			
256-MB (dual-channel)	128-MB		128-MB	
512-MB	512-MB			
512-MB (dual-channel)	256-MB		256-MB	
1-GB	1-GB			
1-GB (dual-channel)	512-MB		512-MB	
2-GB (dual channel)	1-GB		1-GB	
2-GB (dual-channel)	512-MB	512-MB	512-MB	512-MB
4-GB maximum (dual-channel)	1-GB	1-GB	1-GB	1-GB

Storage

Slim Tower



Microtower



	Quantity Supported	Position Supported	Controller
Slim Tower			
Diskette Drive	1	2	Diskette
5.25" Storage Bays	1	1	IDE
3.5" Storage Bay	1	3	IDE
Microtower			
Diskette Drive	1	3	Diskette
5.25" Storage Bays	1	1, 2	IDE
3.5" Storage Bay	1	4, 5, 6	IDE

Technical Specifications

Base Unit Contents	Slim Tower	Microtower
Coprocessor	Integrated	
L2 Cache Architecture/Speed	Full core clock speed	
Cache Upgradeable	Not upgradeable – Integrated into Processor	
System board with Intel 915 Express Chipset with Integrated graphics	X	
Cables	ATA Cable	
Quick Setup Poster	X	
Product Documentation on CD	X	
Operating System CD	X	
Restore CD	X	
Power Cord	X	
Keyboard	X (PS/2)	
Mouse	X (PS/2)	
Memory Parity	Not Needed for non-ECC	
ECC Memory	Not Supported by chipset	
Serial Presence Detect Support	Supported	
Hard Drive Interfaces Supported	2 Serial ATA interfaces	2 Serial ATA interfaces
Hard Drive Controller (PCI) Supported	Serial ATA	
Optical/Removable Storage Interface Supported	1 Ultra ATA/100 interface (supporting 2 devices)	
Optical/Removable Controller (PCI) Supported	Ultra ATA/100	

System Board	Slim Tower	Microtower
Architecture	P4/PCI/PCI Express	
Chipset	Intel 915G Chipset	
I/O Controller	LPC47B397	
System Board Form Factor	Custom	µATX
Processor Socket - 775 Pin ZIF	X	
DIMM Connectors (2.5V)	4	
Intel Graphics Media Accelerator 900 integrated	X	
PCI Connector	2 low profile	2 full height, full length
PCI Express x16	1 (Reversed Pinout)	1 (Normal Pinout)
PCI Express x1	1	
Flash ROM	X	
Audio (AC97 Integrated Audio)	X	
CD ROM IN (Audio)	X	
AUX IN (Audio)	X	
Clear CMOS Button	X	
CPU Fan Header	X	
Chassis Fan Header	X	

Technical Specifications

Chassis Speaker Header	X
CMOS Battery Holder – Lithium	X
Integrated Broadcom NetXtreme Gigabit ethernet for HP	X
Wake-On-Lan®	X
ASF 2.0 (Alert Standard Format)	X
Power Supply Header	X
Power Switch, Power LED & Hard Drive LED Header	X
Password Clear Header	X

Chassis	**Slim Tower**	**Microtower**
Color	Carbonite/Silver	
System Board Form Factors Supported	Custom	Standard µATX
Cooling Solutions Supported	X	
Power Supply Fan (Variable Speed)	X	
Processor Fan-Heatsink (Variable Speed)	X	
Chassis Fan	X	
Internal Speaker	X	
Security Locks Supported	Kensington Cable Lock Provision (Lock not included) Hood Cover Security Loop (Lock not included)	
Security Loop hole diameter	0.236 inches	

Unit Environment and Operating Conditions	**Slim Tower**	**Microtower**
General Unit Operating Guidelines • Keep the computer away from excessive moisture, direct moisture and the extremes of heat and cold, to ensure that unit is operated within the specified operating range. • Leave a 10.2 cm (4 in) clearance on all vented sides of the computer to permit the required airflow. • Never restrict airflow into the computer by blocking any vents or air intakes. • Do not stack computers on top of each other or place computers so near each other that they are subject to each other's re-circulated or preheated air. • Occasionally clean the air vents on the front, back, and any other vented side of the computer. Lint, dust and other foreign matter can block the vents and limit the airflow. • If the computer is to be operated within a separate enclosure, intake and exhaust ventilation must be provided on the enclosure, and the same operating guidelines listed above will still apply.		
Temperature Range	Operating: 50° to 95° F (10° to 35° C)* Non-operating: -22° to 140° F(-30° to 60° C)	
Relative Humidity	Operating: 10% to 90% (non-condensing at ambient) Non-operating: 5% to 95% (non-condensing at ambient)	
Maximum Altitude (unpressurized)	Operating: 10,000 ft (3048 m) Non-operating: 30,000 ft (9144 m)	

Technical Specifications

***NOTE:** Operating temperature is de-rated 1.0 deg C per 300 m (1000 ft) to 3000 m (10,000 ft) above sea level, no direct sustained sunlight. Maximum rate of change is 10 deg C/Hr. The upper limit may be limited by the type and number of options installed.

Power Supply	**Slim Tower**	**Microtower**
Power Supply	240 Watt Power Supply – active PFC	300 Watt Power Supply – passive PFC (115v/230v line switch)
Maximum Rated Power	240 Watt	300 Watt
Full Ranging Input (No Line Select Switch)	--	--
Active Power Factor Correction (APFC) (Input Current is nearly 1/2 a non-APFC PS)	X	--
Passive Power Factor Correction (PFC)	--	X
Operating Voltage Range	90 – 264 VAC	90 – 132/180 – 264 VAC
Rated Voltage Range	100 – 240 VAC	100 – 127/200 – 240 VAC
Rated Line Frequency	50/60 Hz	50/60 Hz
Operating Line Frequency Range	47 – 63 Hz	47 – 63 Hz
Rated Input Current	5A/2.5A	6A/3A
Heat Dissipation	Typical 341 btu/hr (86 kg-cal/hr) Maximum 1170 btu/hr (295 kg-cal/hr)	Typical 341 btu/hr (86 kg-cal/hr) Maximum 1575 btu/hr (397 kg-cal/hr
Power Supply Fan	80mm variable speed	80mm variable speed
Energy Star Compliant	X	X
Blue Angel Compliant (<5w in S5- - Power Off)	X	X
FEMP Standby Power Compliant (<2W in S5 - Power Off) **NOTE:** User must disable the "S5 Wake on LAN" in the F10 setup (default is enabled).	X	X
Power Consumption in ES Mode - Suspend to RAM (S3) (Instantly Available PC)	2.5W to 3W	2.5W to 3W
Processor/Cache Memory Power -Down (S3)	< 3W	< 3W
Environmental and Mechanical Engineering Support Center	http://env-webserver.ccm.cpqcorp.net/EMESC/default.htm	

Technical Specifications

ROM Features	Description	Slim Tower	Microtower
Instantly Available PC (Suspend to RAM – S3)	Allows for very low power consumption with quick resume time	X	X
ROM Based F10 Setup	Review and customize BIOS settings	X	X
Remote System Installation via F12 (PXE) (Remote Boot from Server)	Allows a new or existing system to boot over the network and download software, including the operating system	X	X
System/Emergency ROM Flash Recovery with Video	Recovers corrupted system BIOS	X	X
BIOS Smart Card Support	BIOS preboot smart card authentication (passwords) via USB CCID compliant smart card readers	X	X
Auto Setup when New Hardware Installed	System automatically detects addition of new hardware	X	X
Serial, Parallel, USB, Audio, Network, Enable/Disable Port Control	Enable or disables serial, parallel, USB, audio, and network ports	X	X
Removable Media Write/ Boot Control	Prevents ability to boot from removable media on supported devices (and can disable writes to media)	X	X
Network Server Mode	Allows for secured keyboard-less operation	X	X
Power-On Password	Prevents an unauthorized person from booting up the computer	X	X
Setup Password	Prevents an unauthorized person from changing the system configuration	X	X
Replicated Setup	Saves BIOS settings to diskette or USB disk-on-key in human readable file. Repset.exe utility can then replicate these settings on machines being deployed without entering ROM-based F10 setup	X	X
Master Boot Record Security	Detects changes to MBR and optional restoration, useful in protecting from viruses	X	X
Remote ROM Flash	Provides secure, fail-safe ROM image management from a central network console	X	X
Remote Wakeup	• System administrators can power on, restart, and power off a client computer from a remote location. • Enables cost-effective power consumption when the administrator needs to distribute software, perform security management, or update the ROM	X	X
ACPI (Advanced Configuration and Power Management Interface)	• Allows the system to wake from a low power mode • Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system	X	X
Keyboard-less Operation	The system can be operated without a keyboard	X	X
SMBIOS	System Management BIOS, previously known as DMI BIOS, for system management information	X	X

Technical Specifications

Software	Description	Slim Tower	Microtower
Preinstalled Software		X	X
Genuine Windows XP Professional SP2		X	X
Genuine Windows XP Home SP2		X	X
Computer Setup Utility		X	X
Diagnostics for Windows		X	X
Microsoft Internet Explorer		X	X
Norton AntiVirus 2005		X	X
Microsoft Office XP Professional		X	X
Microsoft Office XP Small Business Edition		X	X
Microsoft Office XP Personal		X	X
Microsoft Office XP Basic		X	X
Pre-loaded Software			
Altiris Deployment Solution Agent	Downloadable from http://www.altiris.com/	X	X
HP Client Manager Software	Downloadable from http://www.hp.com/go/easydeploy	X	X
Local Diskette Boot		X	X
Network Boot		X	X
Disk-on-Key Boot		X	X

Initial Configuration and Deployment	Description	Slim Tower	Microtower
HP Client Management Solutions	HP Client Management Solutions help simplify management of PCs and significantly reduce total ownership costs. These solutions share a common design and are highly integrated due to the extensive work between HP and its partner Altiris. HP Client Manager Software is included free with all HP business PCs. It enables central tracking, monitoring, and management of the hardware aspects of HP client systems: • Get valuable hardware information such as CPU, memory, video, and security settings • Monitor system health to fix problems before they occur • Install drivers and BIOS updates without visiting each PC • Remotely configure BIOS and security settings • Automate processes to quickly resolve hardware problems Additional Altiris solutions (fee-based) are available to address PC management challenges through the entire IT lifecycle including: • Inventory assessment	X	X

	• Software license compliance • Personality migration • Software image deployment • Software distribution • Asset management • Client backup and recovery • Problem resolution Visit http://www.hp.com/go/easydeploy for more information, to download HP Client Manager Software, and to evaluate the Altiris solutions.		
System Software Manager (free)	A free utility that detects and updates BIOS, device drivers, and management agent versions on your networked PCs	X	X
Replicated Setup	Saves BIOS settings to diskette or USB disk-on-key in human readable file. Repset.exe utility can then replicate these settings on machines being deployed without entering ROM-based F10 setup	X	X
HP Systems Insight Manager	Easy to use management application for the enterprise. For more information see HTTP://www.hp.com/go/hpsim.	X	X
Support Software CD	--	X	X
Software Restore CD	Restores computer to its original factory shipping image	X	X
Asset Tag	• Repository for storing company-specific property asset numbers for easy tracking • Initially set equal to the system serial number • Stored in a protected section of non-volatile memory that can be accessed and modified with the F10 Setup program	X	X
DIMM Serial Presence Detect	Detects whether or not memory DIMMs are present and their type	X	X
Hard drive serial number, model, and manufacturer	Hard drive manufacturer, model, and serial number is stored in the hard drive firmware and reported in ROM-based F10 setup	X	X
Monitor serial number, model & manufacturer	--	X	X
System serial number, model, & manufacturer	System serial number, model, & manufacturer stored in a non-volatile memory and can be retrieved with management SW or viewed in ROM-based F10 setup	X	X
ROM revision levels	• Identifies system ROM revision levels and reports in ROM-based F10 setup • Version is stored in an industry standard memory location (SMBIOS) so that management SW applications can use and report this information	X	X
System board revision level	• Allows management SW to read the revision level of the system board • Revision level is digitally encoded into the hardware and cannot be modified	X	X
Memory Change Alert	Alerts management console if memory is removed or changed	X	X
Ownership Tag	A user-defined string stored in non-volatile memory that is displayed in the BIOS splash screen	X	X

Technical Specifications

Security Features	Description	Slim Tower	Microtower
Mechanical Hood Security Provision	Security Loop	X	X
Kensington Lock Support	Kensington lock slot on the chassis	X	X
Cable Lock Provision	Physically secure computer hardware from theft	X	X
Serial, Parallel, USB Enable/Disable	Enable or disable serial, parallel or USB ports and hide them form the operating system	X	X
Port Control	Attaches to back of chassis covering external ports and thereby preventing unauthorized access; also aids in cable management	X	X
Removable Media Write/ Boot Control	Prevents the computer from being booted from removable media on supported devices (and can disable writes to media)	X	X
Power-On Password	Prevents an unauthorized person from booting up the computer	X	X
Setup Password	Prevents an unauthorized person from changing the system configuration	X	X

Fault Notification and Recovery	Description	Slim Tower	Microtower
SMART Hard Drives, Fault & Prefailure Notification	• Allows hard drives to monitor their own health and to raise flags if imminent failures were predicted • Predicts failures before they occur. Tracks fault prediction and failure indication parameters such as re-allocated sector count, spin retry count, calibration retry count • By avoiding actual hard drive failures, SMART hard drives act as "insurance" against unplanned user downtime and potential data loss from hard drive failure	X	X
Memory Change Notification (Requires HP Client Manager Software)	Alerts management console if memory is removed or changed	X	X
Thermal Notification (Requires HP Client Manager Software)	Monitors the temperature state within the chassis. Three modes: • NORMAL – normal temperature ranges • ALERTED – excessive temperatures are detected. Raises a flag so action can be taken to avoid shutdown or provide for a smoother system shutdown • SHUTDOWN – excessive temperatures are encountered. Automatically shuts down the computer without warning before hardware component damage occurs	X	X
Altiris Local Recovery	Provides data and system file protection for HP business PCs to enable fast recovery of information that is accidentally deleted or if the system becomes corrupted. Designed for disconnected or seldom-connected users, Local Recovery protects your HP computer's data and system state by taking scheduled snapshots, which are then stored in a protected area on the local hard disk. System backup and disaster recovery is now simple and fast for all users, regardless of connectivity.	X	X
Surge Tolerant Full Ranging Power Supply	Withstands power surges up to 2000V	X	X
Ultra ATA Integrity Monitoring (CRC Checking)	Provides data transfer verification and proactive notification of hard drive data transmission problems with recommendations for enhancing system performance. It detects all the following errors types:	X	X

	• single bit errors • double bit errors • an odd number of errors • error bursts up to 32-bits long		

System Software Updating	Description	Slim Tower	Microtower
Remote ROM Flash	Provides secure, fail-safe ROM image management from a central network console	X	X
Remote Wakeup/ Remote Shutdown	• System administrators can power on, restart, and power off a client computer from a remote location. • Enables cost-effective power consumption when the administrator needs to distribute software, perform security management, or update the ROM.	X	X
Support Software CD & WWW	--	X	X

Other Features	Description	Slim Tower	Microtower
ACPI-Ready Hardware	Advanced Configuration and Power Management Interface (ACPI). • Allows the system to wake from a low power mode. • Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system.	X	X
SMBIOS	System Management BIOS, previously known as DMI BIOS, for system management information	X	X
Microsoft Windows Hardware Quality Lab (WHQL)	Microsoft Windows Hardware Quality Lab (WHQL) certified ensures that the system meets Microsoft's standard for hardware compatibility with Windows XP	X	X
Dual-State Power Button	Power button acts as both an on/off button and suspend-to-sleep button	X	X

Serviceability Features of System	Description	Slim Tower	Microtower
Dual Color Power LED on Front of Computer (Indicates Normal Operations and Fault Conditions)	--	X	X
Diagnostic LED Explanation Table	Number of 1-second red LED blinks followed by 2-second pause, then repeats: 2-processor thermal protection activated 3-processor not installed 4-power supply failure 5-memory error 6-video error 7-PCA failure (ROM detected failure prior to video) 8-invalid ROM, bootblock recover mode	X	X

Technical Specifications

System/Emergency ROM Flash Recovery with Video	Recovers corrupted system BIOS	X	X
Diagnostic for Windows Software	--	X	X
Configuration Record SW	--	X	X
Over-Temp Warning on Screen (Requires IM Agents)	--	X	X
HP OS CD (Restore OS CD)	Restores computer to its original factory shipping image	X	X
HP Restore CD	Restores the computer to its original factory shipping image	X	X
Flash ROM	--	X	X
5 Aux Power LED on System PCA	--	X	X
Dual Function 5V Aux Power LED (ON)/PS_ON LED (OFF) on System PCA	--	X	--
Diagnostic Power Switch LED on board	--	X	--
Clear Password Jumper	--	X	X
Clear CMOS Button	--	X	X
CMOS Battery Holder for easy Replacement	--	X	X
Processor ZIP Socket for easy Upgrade	--	X	X
DIMM Connectors for easy Upgrade	--	X	X
NIC LEDs (integrated) (Green & Amber)	Used to determine NIC status	X	X

Serviceability Features of Chassis	**Description**	**Slim Tower**	**Microtower**
Dual Color Power and HD LED – To Indicate Normal Operations and Fault Conditions	--	X	X
ASF 2.0 support (Alert Standard Format)	Industry-standard specification for network alerting in operating system-absent environments	X	X
Front power switch	--	X	X
Green Pull Tabs, and Quick Release Latches for easy Identification	--	X	X
Color coordinated cables and connectors		X	X
System memory can be upgraded without removing the system board or any internal components	Eases memory upgrading	X	X

Technical Specifications

Tool-less Hood Removal	Eases entry to the chassis without use of special tools	X (2 side buttons – Hood and bezel now one piece)	X (1thumbscrew)
Tool-less Hard Drive, CD & Diskette Removal	--	X	X
Tool-less System Board Removal	No special tools required for system board removal or maintenance	X	X
Universal Tower Stand	• Drive Protection System • A diagnostic hard drive self test. It scans critical physical components and every sector of the hard drive for physical faults and then reports any faults to the user. • Running independently of the operating system, it can be accessed through a Windows-based diagnostics utility or through the computer's setup procedure. It produces an evaluation on whether the hard drive is the source of the problem and needs to be replaced. • The system expands on the Self-Monitoring, Analysis, and Reporting Technology (SMART), a continuously running systems diagnostic that alerts the user to certain types of failures	X (Optional)	--
Drive Self Tests (DPS)		X	X
DPS Access through F10 Setup during Boot		X	X
DPS Access through Diagnostics for Windows		X	X
SMART Technology (Self-Monitoring, Analysis and Reporting Technology)	Allows hard drives to monitor their own health and to raise flags if imminent failures were predicted • Predicts failures before they occur. Tracks fault prediction and failure indication parameters such as re-allocated sector count, spin retry count, calibration retry count • By avoiding actual hard drive failures, SMART hard drives act as "insurance" against unplanned user downtime and potential data loss from hard drive failure	X	X
SMART I – Drive Failure Prediction		X	X
SMART II – Off-Line Data Collection		X	X
SMART III – Off-Line Read Scanning with Defect Reallocation		X	X

RoHS Compliance	Hewlett-Packard is committed to compliance with all applicable environmental laws and regulations, including the European Union Restriction of Hazardous Substances (RoHS) Directive. HP's goal is to exceed compliance obligations by meeting the requirements of the RoHS Directive on a worldwide basis. From July 1, 2006, RoHS substances will be virtually eliminated (virtually = to levels below legal limits) for all HP electronic products subject to the RoHS Directive, except where it is widely recognized that there is no technically feasible alternative (as indicated by an exemption under the EU RoHS Directive). Prior to this date, customers interested in purchasing RoHS compliant product should contact their local HP sales or distribution office to determine specific configuration status.

Technical Specifications

Service and Support	On-site Warranty and Service Note 1: This three-year (3-1-1), limited warranty and service offering delivers three years of parts and one year of both labor and on-site repair. Response time is next business-day Note 2 and includes free telephone support Note 3 24 x 7. Global coverage Note 2 ensures that any product purchased in one country and transferred to another non-restricted country will remain fully covered under the original warranty and service offering. Some countries/regions do not offer one year onsite and labor.
	NOTE 1: Terms and conditions may vary by country. Certain restrictions and exclusions apply.
	NOTE 2: On-site service may be provided pursuant to a service contract between HP and an authorized HP third-party provider, and is not available in certain countries. Global service response times are based on commercially reasonable best effort and may vary by country.
	NOTE 3: Technical telephone support applies only to HP-configured, HP and HP-qualified, third-party hardware and software. Toll-free calling and 24 x 7 support may not be available in some countries.

Technical Specifications - Audio

AC97 Integrated ADI 1981B Audio	**Type**	Integrated
	AC '97 Stereo Codec	Yes
	FM Synthesis Support	Yes – Yamaha XG Lite
	OPL3 FM Synthesis Support	Yes
	Sound Blaster Compatibility	Yes
	Audio Jacks	Microphone-In (20-K ohm Input Impedance); rear stereo and front analog microphone ports available except for USDT which has front stereo microphone only Line-In (12-K ohm Input Impedance) Line-Out * (less than 800 ohms Output Impedance, expects at least a 10-K ohm load) Headphone-Out (2.5 Ohms Output Impedance, expects at least a 32-ohm load)
	NOTE: *Internal Speaker Amplifier is for Internal Speaker only. External Speakers need to be powered externally.	
	Sampling	7 kHz – 48 kHz
	Wavetable Syntheses (software)	Yes – GM and FM Midi Support, Direct Music and Down Loadable Soundset (4 Meg DLS Level 1 and 2 Support)
	3D Positional Sound	No
	Digital Audio	Yes
	Analog Audio	Yes
	Number of Channels on Line-Out (mono/stereo)	Stereo (Left & Right channels)
	Internal Audio Speaker Power Rating	3W
	Internal Speaker	Yes
	Hardware Equalizer for Internal Speaker	Fixed 7 Band ParametricEQ
	External Speaker Jack (Line-Out)	Yes

Technical Specifications - Communications

Integrated Broadcom NetXtreme Gigabit PCI-E ethernet NIC	**Connector**	RJ-45
	Controller	Broadcom 5782 PCI LAN Controller
	Memory	Integrated 96Kb frame buffer memory
	Data rates supported	10/100/1000 Mbps
	Compliance	IEEE 802.1A, 802.1P, 802.1Q, 802.2, 802.3, 802.3AB and 802.3u compliant, 802.3x flow control
	Bus architecture	PCI 2.2
	Data path width	32-bit, 33/66 MHz bus interface
	Data transfer mode	Bus-master DMA
	Hardware certifications	FCC class B, CE, TUV- cTUVus Mark Canada and United States, TUV- GS Mark for European Union
	Power requirement	1.48 watts @ +3.3V AUX supply with 5V tolerance
	Boot ROM support	Yes
	Network transfer rate	10BASE-T (half-duplex) 10 Mbps
		10BASE-T (full-duplex) 20 Mbps
		100BASE-TX (half-duplex) 100 Mbps
		100BASE-TX (full-duplex) 200 Mbps
		1000BASE-T, 1000 Mbps
	Environmental	Operating temperature 32° to 131° F (0° to 55° C)
		Operating humidity 85% at 131° F (55° C)
	Dimensions	4.7 x 2.0 x 0.08 in (12 x 5 x 1.9 cm)
	Management capabilities	ACPI, WOL and DMI 2.0, PXE 2.0, WfM 2.0
	Alerting	ASF 1.0

Intel PRO/1000 MT Gigabit PCI NIC	**Connector**	RJ-45
	Controller	Intel 82540EM Gigabit Controller
	Memory	Integrated 96Kb frame buffer memory
	Data rates supported	10/100/1000 Mbps
	Compliance	IEEE 802.1A, 802.1P, 802.1P, 802.1Q, 802.2, 802.3, 802.3AB and 802.3u compliant, 802.3x flow control
	Bus architecture	PCI 2.2
	Data path width	32-bit, 33/66 MHz bus interface
	Data transfer mode	Bus-master DMA
	Hardware certifications	FCC, B, CE, TUV- cTUVus Mark Canada and United States, TUV- GS Mark for European Union
	Power requirement	1.48 watts @ +3.3V AUX supply with 5V tolerance
	Boot ROM support	Yes

Technical Specifications - Communications

Network transfer rate	10BASE-T (half-duplex) 10 Mbps	
	10BASE-T (full-duplex) 20 Mbps	
	100BASE-TX (half-duplex) 100 Mbps	
	100BASE-TX (full-duplex) 200 Mbps	
	1000BASE-T, 1000 Mbps	
Environmental	Operating temperature	32° to 131° F (0° to 55° C)
	Operating humidity	85% at 131° F (55° C)
Dimensions	6.4 x 4.8 x 0.8 in (16.3 x 12.1 x 1.9 cm)	
Management capabilities	ACPI, WOL and DMI 2.0, PXE 2.0, WfM 2.0, Intel PROset II utility	

Agere PCI 56K International SoftModem	**Data Transmission**	56,000 Kbps maximum downstream data
	NOTE: 56 Kbps technology refers to download speeds only and requires compatible modems at server sites. Other conditions may limit modem speed. FCC limitations allow a maximum of 53 Kbps during download transmissions.	
	Data Speeds	(Upload only) 33,600/31,200/28,800/26,400/21,600/19,200/16,800/ 14,400/12,000/9,600/7,200/ 4,800/2,400/1,200/300
	Data Standards	ITU-T V.90, ITU-T V.34, V.44, V.42, V.42bis, V.32bis, V.32, V.29,v.23, V.22bis, B.22, V.21, Bell 212A, and Bell 203J
	Fax Speeds	14,400/12,000/9,600/7,200/4,800/2,400/300 b/s
	Fax Mode Capabilities	ITU-T T.31 class 1 FAX, V. 17, V.29, V.27ter, and V.21 Channel 2
	Error Correction and Data Compression	V.44, 42bis, V.42 and MNP2-5, LAPM
	Power Management	ACPI; PPMI 1.1 and wake support with PME and Vaux; meets PCI 3.0 requirements and PC 2001 requirements
	Upgradeability	Driver upgradeable for future enhancements
	Video	ITU-T V.80 video ready interface
	Optional Ring Wakeup Signal	TIA/EIA 602 standard AT command set
		Integrated DTE interface with speeds of up to 115.2 Kbps, parallel 16550a UART-compatible interface
	Operating Temperature	32° to 158° F (0° to 70° C)
	Operating Humidity	20% to 90%, non-condensing
	Power	Requires a 3.3-V auxiliary power rail on PCI bus
		Uses only one PCI load (i.e., one grant/request pair), one shared IRQ, one electrical load
	Chipset	Agere Systems SV92PP – Integrated PCI interface with 5-V tolerant buffers
	Dimensions (L X H)	Complies with PCI low profile specifications—6.7 x 2.3 in (17.0 x 5.8 cm) and supports high- and low-profile brackets
	Connection	Single RJ-11 connector
	Other Features	Digital line protection, support for high profile and low profile brackets, PnP ID support
	Safety	UL recognized to UL 1950, 3rd edition (U.S. and Canada); IEC 950 (TUV, NEMKO, DEMKO, SEMKO); CE Mark, EC 950 (TUV, NEMKO, DEMKO, SEMKO, CE mark

Technical Specifications - Communications

EMC	FCC Part 15, IC ES003, EN 55022, 3rd edition, EN 55024, annex A, EN 61000-4-6, EN 61000-4-8
Telecom	FCC Part 68, IC-CS-03 (Canada); Worldwide PTT approvals
Health	Bare PCB material compliant to 94V-0 or better (marked as such)
Other	PC 2001 compliant, PCI version 3.0, WHQL approved; ACPI compliant

Technical Specifications - Graphics

Integrated Graphics Media Accelerator 900	**3D/2D Controller**	Microsoft® DirectX® 9 based with support for Pixel Shader 2.0, 4:1 anisotropic filtering, Gaussian texture filtering, shadow maps, volumetric textures, double-sided stencil buffers, and 4 pixel pipes.
	VGA Controller	Integrated
	Bus Type	PCI Express™ x16 (Internal graphics is automatically disabled if an external graphics card is installed. If the external graphics card is installed in a PCI slot, the internal graphics can be re-enabled using the system's BIOS setup utility. If the external graphics card is installed in the PCI Express™ slot, the internal graphics cannot be enabled).
	RAMDAC	Integrated, 400 MHz
	Memory	Graphics memory is shared with system memory. Graphics memory usage can vary from 8-128 MB depending on the amount of system memory installed and system load. 8 MB is pre-allocated for graphics use at system boot time. Additional memory is allocated for graphics using Intel's Dynamic Video Memory Technology (DVMT) to balance the optimum amount of memory between graphics and other system use. Memory < 256 MB: 8 MB pre-allocated (for DOS) + 24 MB DVMT : max frame buffer of 32 MB 256 MB <= Memory < 512 MB:8 MB pre-allocated + 56 MB DVMT: max frame buffer of 64 MB 512 MB <= Memory: 8 MB pre-allocated + 120 MB DVMT : max frame buffer of 128 MB
	Controller Clock Speed	333 MHz
	Overlay Planes	Single overlay support with 5x3 filtering
	Maximum Color Depth	32 bits/pixel
	Maximum Vertical Refresh Rate	85 Hz at up to 1920x1440, 75Hz at 2048x1536. Varies with mode and configuration. See table below.
	Multi-display Support	Support for one CRT via the motherboard's VGA connector. Support for an additional DVI-D display via the optional DVI ADD2 card. Dual independent displays and dual synchronous (Twin or Clone mode) displays are supported.
	Graphics/Video API Support	Microsoft DirectX®9, DirectXVA®, VMR9, GDI/GDI+; OpenGL® 1.4.

Technical Specifications - Graphics

Resolutions Supported[1]	Resolution	Maximum Refresh Rate (Hz)	
		Analog Monitor	Digital Monitor
	640 x 480	85	70
	800 x 600	85	70
	1024 x 768	85	70
	1152 x 864	85	70
	1280 x768	60	70
	1280 x 960	85	70
	1280 x 1024	85	70
	1600 x 900	60	70
	1600 x 1200	85	60
	1920 x 1080	60	-
	1920 x 1200	60	-
	1920 x 1440	75	-
	2048 x 1536	75	-

[1] Modes listed are supported with a single active display. The supported mode list for multiple active displays is a subset of this list. Not all modes will support video playback and some supported modes may use software MC (motion compensation) rather than hardware MC. Not all modes will support 3D acceleration depending on the system configuration (e.g., resolution selected, size of frame buffer, number of installed memory modules, etc.).
NOTE: Other resolutions and refresh rates may be selectable but are not recommended.

NVIDIA Quadro NVS 280 Graphics Card	**Form Factor**	ATX
	Graphic Controller	Integrated Quadro 280 2-D graphics processor unit (GPU)
	VGA controller	Integrated into the Quadro GPU
	Bus type	Workstations: AGP 8X or PCI Desktops: PCI
	RAMDAC	Dual 350 MHz
	Memory	64 MB DDR with frame buffer and Texture storage
	Connector	Single High-density Flex Connector
	Dimensions	Low-profile, 2.586 x 6.6 in (6.57 x 16.76 cm)
	Controller clock speed	275 MHz
	Color planes	32-bit color buffer
	Overlay planes	1 16-bit Video overlay plane
	Maximum vertical refresh rate	120 Hz
	Maximum pixel clock	350 MHz
	Multi-monitor support	Dual analog or digital monitors
	Single DVI Support	Yes
	Dual DVI Support	Yes
	High-definition Video Processor (HDVP)	Full-screen, full-frame video playback of HDTV and DVD content DVD-ready motion compensation for MPEG-2 Independent hardware color controls for video overlay Hardware color-space conversion (YUV 4:2:2 and 4:2:0)

IDCT motion compensation
5-tap horizontal by 3-tap vertical filtering
8:1 up/down scaling

Available graphics drivers

Microsoft Windows 2000 and Microsoft Windows XP (Provides full native Dual View mode, Span or Big Desktop mode, and Clone mode). HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/eng/software_drivers.html.

Analog Resolution	Maximum Refresh Rate	Analog Resolution
640 x 480	240 Hz	640 x 480
800 x 600	240 Hz	800 x 600
1024 x 768	200 Hz	1024 x 768
1600 x 1200	170 Hz	1600 x 1200
1600 x 1200	150 Hz	1600 x 1200
1600 x 1200	100 Hz	1600 x 1200
1920 x 1200	85 Hz	1920 x 1200
1920 x 1200	85 Hz	1920 x 1200
1920 x 1440	75 Hz	1920 x 1440
2048 x 1536	60 Hz	2048 x 1536
Digital Resolution	**Maximum Refresh Rate**	**Digital Resolution**
640 x 480	75 Hz	640 x 480
800 x 600	75 Hz	800 x 600
1024 x 768	75 Hz	1024 x 768
1152 x 864	60 Hz	1152 x 864
1280 x 1024	60 Hz	1280 x 1024
1600 x 1200	60 Hz (primary only)	1600 x 1200

ATI RADEON X300 SE PCI Express (PCIe x16) Graphics

Models: ATI RADEON X300 SE PCI Express 128-MB DDR single head DVI with TV out

Bus Type: PCI Express (x16 lanes)

Maximum Vertical Refresh Rate: 85 Hz

Display Support: Integrated 400MHz RAMDAC

Display Max Resolution: 2048 x 1536

Board Display Options

128 MB Card Display Option

DVI-I + TV

DVI-I supports analog CRT or flat panel or digital flat panel (using DVI-A, DVI-D or DVI-I connector)
DVI-I supports analog CRT or flat panel (with VGA connector and DVI-I to VGA dongle)

TV Connector is a 7-pin mini-DIN (also allowing 4-pin S-Video without adaptor)

Board Configuration	Specification	Description
128 MB Frame Buffer	Graphics Chip	RADEON X300 SE PCI Express

		Core clock	200 MHz
		Memory clock	200 MHz
		Frame buffer	128 MB DDR
		Memory I/O	64 bit
		Memory Configuration	4 pcs 16M x 16 DDR
	Memory Type	DDR1	
	Maximum Memory	128MB	
	Core Power	10 W (Max ASIC power) 18 W (Max Board power)	

ATI RADEON X1300 PCIe Graphics Card (256 MB)	**Bus Type**	PCI Express (x16 lanes)	
	Maximum Vertical Refresh Rate	85 Hz	
	Display Support	Integrated 400MHz RAMDAC	
	Display Max Resolution	2048 x 1536	
	Board Display Options	DVI-I + TV DVI-I supports analog CRT or flat panel or digital flat panel (using DVI-A, DVI-D or DVI-I connector) DVI-I supports analog CRT or flat panel (with VGA connector and DVI-I to VGA dongle) TV connector is a 4-pin mini-DIN S-video connector	
	Board Configuration 128 MB Frame Buffer	**Specification**	**Description**
		Graphics Chip	RV515
		Core clock	450 MHz
		Memory clock	250 MHz
		Frame buffer	256 MB DDR2
	Languages supported	24 languages: English, Arabic, Chinese Simplified, Chinese Traditional, Czechoslovakian, Danish, Dutch, Finnish, French, German, Greek, Hebrew, Hungarian, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Russian, Spanish, Swedish, Thai, Turkish	
	Core Power	25 W (Max board power)	
	Option kit contents	• ATI RADEON X1300 PCIe graphics card with full height bracket attached • Low profile bracket • DVI-to-VGA Adapter • Software CD with graphics drivers • Warranty documentation	
	Compliance standards	**EMC Emissions:** a) FCC Part 15, Subpart B – Unintentional Radiators, Class B Computing Devices for Home & Office Use b) CISPR22: 1997/EN 55022:1998 – Class B – Limits and methods of measurement of radio disturbance characteristics of Information Technology Equipment c) Canadian Standard ICES-003 is equivalent to CISPR22 d) Taiwanese Standard BSMI	

e) Japanese VCCI
f) Australian C-Tick

EMC Immunity:
CISPR 24:1997/EN 55024:1998 – Information Technology Equipment - Immunity Characteristics – Limits and Methods of Measurement.

Safety:
UL 60950 (USA) & EN 60950 (EU): Safety of Information Technology Equipment, Including Electrical Business Equipment. All boards meet UL PCB flammability requirements.

Technical Specifications - Hard Drives

7200 rpm Serial ATA Hard Drives	**40-GB**	**Capacity**	40,020,000,000 bytes	
		Height	1 inch (2.54 mm)	
		Width	Media diameter: 3.5 in (8.89 cm) Physical size: 4 in (10.2 cm)	
		Interface	Serial ATA	
		Synchronous Transfer Rate (Maximum)	Up to 1.5 Gb/s	
		Buffer	2 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	1.0 ms
			Average	8.5 ms
			Full-Stroke	18.0 ms
		Rotational Speed	7,200 rpm	
		Logical Blocks	78,165,360	
		Operating Temperature	41° to 131° F (5° to 55° C)	
	80-GB	**Capacity**	85,899,345,920 bytes	
		Height	1 in (2.54 cm)	
		Width	Media diameter: 3.5 in (8.89 cm) Physical size: 4 in (10.2 cm)	
		Interface	Serial ATA	
		Synchronous Transfer Rate (Maximum)	Up to 1.5 Gb/s	
		Buffer	8 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.9 ms
			Average	9.3 ms
			Full-Stroke	18 ms
		Rotational Speed	7,200 rpm	
		Logical Blocks	153,301,488	
		Operating Temperature	41° to 131° F (5° to 55° C)	
	160-GB	**Capacity**	171,798,691,840 bytes	
		Height	1 in (2.54 cm)	
		Width	Media diameter: 3.5 in (8.89 cm) Physical size: 4 in (10.2 cm)	
		Interface	Serial ATA	
		Synchronous Transfer Rate (Maximum)	Up to 1.5 Gb/s	
		Buffer	8 MB	

Technical Specifications - Hard Drives

Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.9 ms
	Average	9.3 ms
	Full-Stroke	18 ms
Rotational Speed	7,200 rpm	
Logical Blocks	312,581,808	
Operating Temperature	41° to 131° F (5° to 55° C)	

Technical Specifications - Input/Output Devices

HP Standard Keyboard (PS/2 or USB)	**Physical characteristics**	**Keys**	104, 105, 106, 107, 109 layout (depending upon country)
		Dimensions (L x W x H)	18.0 x 6.4 x 0.98 in (45.8 x 16.3 x 2.5 cm)
		Weight	2 lb (0.9 kg) minimum
	Electrical	**Operating voltage**	+ 5VDC ± 5%
		Power consumption	50-mA maximum (with three LEDs ON)
		System interface	USB Type A plug connector
		ESD	CE level 4, 15-kV air discharge
		EMI – RFI	Conforms to FCC rules for a Class B computing device
		Microsoft PC 99 – 2001	Functionally compliant
	Mechanical	**Languages**	38 available
		Keycaps	Low-profile design
		Switch actuation	55-g nominal peak force with tactile feedback
		Switch life	20 million keystrokes (using Hasco modified tester)
		Switch type	Contamination-resistant switch membrane
		Key-leveling mechanisms	For all double-wide and greater-length keys
		Cable length	6 ft (1.8 m)
		Microsoft PC 99 - 2001	Mechanically compliant
		Acoustics	43-dBA maximum sound pressure level
	Environmental	**Operating temperature**	50° to 122° F (10° to 50° C)
		Non-operating temperature	-22° to 140° F (-30° to 60° C)
		Operating humidity	10% to 90% (non-condensing at ambient)
		Non-operating humidity	20% to 80% (non-condensing at ambient)
		Operating shock	40 g, six surfaces
		Non-operating shock	80 g, six surfaces
		Operating vibration	2-g peak acceleration
		Non-operating vibration	4-g peak acceleration
		Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
		Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence
	Approvals	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC	
	Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS	

Technical Specifications - Input/Output Devices

2-Button Scroll Mouse (PS/2 or USB)	**Scroll Wheel**	8 mm	
	Maximum Rotation Speed	30 mm/s	
	Switch Type	Light force micro-switch	
	Switch Life	1 million operations	
	Mechanical Life	Minimum 200,000 revolutions	
	Environmental	**Operating Temperature**	50° to 122° F (10° to 50° C)
		Non-operating Temperature	-22° to 140° F (-30° to 60° C)
		Operating Humidity	10% to 90% (non condensing at ambient)
		Non-operating Humidity	20% to 80% (non condensing at ambient)
		Operating Shock	40 g, 6 surfaces
		Non-operating Shock	80 g, 6 surfaces
		Operating Vibration	2 g peak acceleration
		Non-operating Vibration	4 g peak acceleration
	Electrical	**Operating Voltage**	+ 5VDC ± 10%
		Power Consumption	15mA
		System Consumption	PS/2 mini-din connector
		ESD	CE level 4, 15 kV air discharge
		EMI-RFI	Conforms to FCC rules for a Class B computing device
		PC98	Functionally compliant
	Mechanical	**Resolution**	400 ± 20% DPI
		Tracking Speed	10 in/s maximum
		Acceleration	100 in/s
		Switch Actuation	85 g nominal peak force
		Switch Life	1,000,000 operations (using Hasco modified tester)
		Cable Length	2 m
		PC98-99	Mechanically compliant
	Regulatory Approvals	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BCIQ, C-Tick	

Technical Specifications - Input/Output Devices

HP PS/2 Optical Scroll Mouse	**Dimensions** (H x L x W)	3.95 x 6.21 x 11.7 cm (1.56 x 2.44 x 4.61 in)	
	Weight	4.44 oz (126 g)	
	Environmental	**Operating temperature**	-32° to 104°F (0° to 40° C)
		Non-operating temperature	-4° to 140°F (-20° to 60° C)
		Operating humidity	10% to 90% (non condensing at ambient)
		Non-operating humidity	10% to 90% non condensing
		Operating shock	40 g, 6 surfaces
		Non-operating shock	80 g, 6 surfaces
		Operating vibration	2 g peak acceleration
		Non-operating vibration	4 g peak acceleration
		Drop (out of box)	80 cm height onto asphalt tile over concrete or equivalent, 5-drop in 5 direction except the cable face
	Electrical	**Operating voltage**	5 VDC ± 10%
		Power consumption	100mA
		System consumption	PS/2 mini-din connector
		ESD	CE level 4, 15 kV air discharge
		EMI-RFI	Conforms to FCC rules for a Class B computing device
		Microsoft PC99 – 2001	Functionally compliant
	Mechanical	**Resolution**	400 ± 20% DPI
		Tracking speed	10 in/s (25.4 cm/s) maximum
		Acceleration	100 in/s/s (2.54 m/s/s)
		Switch actuation	61 g nominal peak force
		Switch life	3,000,000 operations (using Hasco modified tester)
		Switch type	Low force micro-switches
		Tracking mechanism life	155 mi (250 km) at average speed of 10 in/s
		Cable length	6 ft (1.8 m)
		Microsoft PC99 – 2001	Mechanically compliant
	Scroll wheel	**Width**	8 mm
		Diameter	1.01 in (25.6 mm)
		Maximum rotation speed	48 rats/sec
		Switch type	Light force micro-switch
		Switch life	1 million operations
		Mechanical life	Minimum 200,000 revolutions
	Regulatory approvals	**Compliant**	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC

Technical Specifications - Optical Storage

48X Max CD-ROM Drive	**Interface**	ATAPI IDE	
	Data Buffer	16.6 Mbps	
	Data Transfer Rate	Sustained—1200 Kbps minimum (audio)	Variable (CD)—3,000 to 7,200 Kbps
	Disk Rotation Technology	CAV (Constant Angular Velocity)	
	Access Time (ms)	Random: <100 ms	Full-stroke seek: <150 ms
	Average Access Time	< 80 ms	
	Cache Buffer (standard/maximum)	128 KB	
	Disk Formats Read	Multi-session Photo CD, multi-read CD-ROM, CD text, audio CD, CD-I, CD-RW, CD-R, CD-Extra, CD-ROM XA	
	Disk Formats Written	None	
	Disk Capacity (CD)	650 MB	
	Block Size	Mode 1 – 2,048, 2,352 bytes	
		Mode 2-1, 2,088, 2,328, 2,336, 2,340, 2,353 bytes	
		Mode 2-2, 2,328, 2,336, 2,340, 2,352 bytes	
		CD-DA – 2,352, 2,368 bytes	
	Diameter	12 cm; 8 cm	
	Thickness	1.2 mm	
	Track Pitch	1.6 µm	
	Audio Output Level	Line-out—0.7 V @ 47 Kohm	Headphone—0.6 V @ 32 ohm
	Startup Time	<7 seconds (typical); < 30 seconds with multi-session	
	Operating Conditions	Temperature	41° to 120° F (5° to 50° C)
		Relative Humidity	10% to 80%
	Dimensions (H x W x D, maximum)	1.7 x 5.9 x 8.0 in (4.3 x 15.0 x 20.3 cm)	
	Weight	2.6 lb (1200 g)	
	MPEG Playback Graphics Solution Support	None	
48X/32X/48X CD-RW Drive	**Orientation**	Either horizontal or vertical	
	Disc Loading Mechanism	Half-height, tray load	
	Interface Type	ATAPI IDE	
	Dimensions—external (W x H x D)	7.99 x 5.88 x 1.71 in (203 x 149.5 x 43.5 mm)	
	Weight	2.6 lb (1.2 kg)	
	Disc Diameter	12 cm, 8 cm	
	Disc Thickness	1.2 mm	
	Track Pitch	1.6 µm	

Technical Specifications - Optical Storage

Disc Center Hole Diameter	15 mm	
Reference Scanning Velocity	1.2 m/s	
Recording/Playing Time	80 minutes with CD-R media	
Read Only Disc Parameters	**Formats and Modes Supported**	CD-ROM – Mode 1; CD-ROM XA – Mode 2 (forms 1 and 2); CD digital audio; CD Extra; CD-I – Mode 2 (forms 1 and 2) and CD-I-Ready; Photo CD (single and multi-session); video CD
	Capacity	185 MB (Mode 2, 8cm); 540 MB (Mode 1, 12 cm); 650 MB (Mode 2, 12 cm); 700 MB (Mode 2, 12 cm)
	Block Size	Mode 1 – 2,048 and 2,352 bytes; mode 2, form 1 – 2,048; 2,328; 2,336; 2,340 and 2,352 bytes; mode 2, form 2-2,328; 2,336; 2,340 and 2,352 bytes; CD-DA-2,352 and 2,368 bytes
Writeable Disc Parameters	**Disc Type**	CD-R and CD-RW
	Write Methods	Disc at Once, Track at Once, Session at Once, Variable Packet, Fixed Packet
	Format and Modes Supported	CD-ROM (mode 1); CD-ROM XA (mode 2, forms 1 and 2); CD digital audio, CD-I (mode 2, forms 1 and 2); video CD
	Capacity	185 MB (Mode 2, 8cm); 540 MB (Mode 1, 12 cm); 650 MB (Mode 2, 12 cm); 700 MB (Mode 2, 12 cm)
	Block Size	Mode 1 – 2,048 bytes; mode 2, form 1 – 2,048 and 2,352 bytes; mode 2, form 2 – 2,352 bytes; CD-DA ---2,352 bytes
Access Times (typical)	**Random**	< 120 ms
	Full Stroke	< 200 ms
Maximum Data Transfer Rates	CD-RW Write	4800 KB/s (32X) Max
	CD-ROM, CD-R read	7200 KB/s (48X) Max
	CD-RW read	7200 KB/s (32X) Max
	CD-R write	7200 KB/s (48X) Max
Data Transfer Modes	ATA PIO mode 4 (16.7MB/s); ATA multi-word DMA mode 2 (16.7 MB/s); ATA UltraDMA mode 0 (16.7 MB/s); ATA UltraDMA mode 1 (24 MB/s); ATA UltraDMA mode 2 (33 MB/s) – default.	
Cache Buffer	2 MB (minimum)	
Start-up Time (single)	< 7 seconds typical	
Start-up Time (multi-session)	< 30 seconds typical	
Stop Time	< 4 seconds	
Power	**Source**	Four-pin, DC power receptacle
	DC power requirement	5 VDC ± 5%—100 mV ripple p-p 12 VDC ± 5%—200 mV ripple p-p
	DC current	5 VCD < 1A (typical) < 1600 mA (maximum)

		12 VCD	< 600 mA (typical) < 1.4A (maximum)
		Total Drive Power (Standby mode)	< 2.5 watt
	Audio Output Level	0.7 Vrms	
	Configuration Jumper Block	Master, slave and cable select modes	
	Data Interface Connector	50-pin IDE interface	
	Environmental (all conditions, non-condensing)	**Temperature** (operating)	41° to 122° F (5° to 50° C)
		Relative Humidity (operating)	10% to 90%
		Maximum Wet Bulb Temperature (operating)	84° F (29° C)

16X/40X DVD-ROM	**Height**	5.25-in, half-height	
	Interface Type	ATAPI	
	Dimensions– External, Excluding Bezel (W x H)	5.88 x 1.71 in (149.5 x 43.5 mm)	
	Disc Diameter	12 cm, 8 cm	
	Disc Thickness	1.2 mm	
	Track Pitch	1.6 µm (CD), 0.74 µm (DVD)	
	Disc Center Hole Diameter	15 mm	
	Disc Formats	DVD-ROM (single and dual layer); DVD-video; DVD-R version 1.0 and 2.0; DVD-RW version 1.0 and 1.1; DVD-R multi-border; DVD+RW; DVD+R; CD-ROM Mode 1 and 2; CD-DA; CD-ROM XA Mode 2, Form 1 and 2; CD-extra; CD-text; CD-I Mode 2, Form 1 and 2; CD-I ready; video CD, CD-bridge; PhotoCD (single and multi-session); CD-R; CD-RW	
	Disc Capacity	**DVD-ROM**	4.7 GB (DVD-5), 8.54 GB (DVD-9), 9.4 GB (DVD-10), 3.95 GB (DVD-R version 1.0), 4.7 GB (DVD-R version 2.0), 4.7 GB (DVD-RW version 1.0 and 1.1), 4.7 GB (DVD+RW), 4.7G (DVD+R)
		CD-ROM	540 MB (Mode 1, 12 cm), 640 MB (Mode 2, 12 cm), 700 MB (80 minimum CD-R and CD-RW), 180 MB (8 cm)
	Block Size (bytes)	DVD-ROM – 2048; CD-ROM Mode 0 – 2352; CD-ROM Mode 1 – 2352, 2340, 2336, 2048; CD-ROM Mode 2 – 2352, 2340, 2336, 2048	
	Access Times (typical reads, including settling)	**DVD-ROM Single Layer**	< 120 ms
		CD-ROM Mode 1	< 90 ms
		Full Stroke DVD	< 240 ms (seek)
		Full Stroke CD	< 160 ms (seek)
	Maximum Data Transfer Rates	**CD-ROM Read**	6000 KB/s (40X) Max
		DVD-ROM Read	21,600 KB/s (16X) Max

Technical Specifications - Optical Storage

	Data Transfer Modes	PIO Mode 4 (16.6 MB/s); Multi-word DMA mode 2 (16.6 MB/s); UltraDMA Mode 3 (44.4 MB/s)	
	Power	**Source**	Four-pin, DC power receptacle
		DC Power Requirement	5 VDC ± 5% – 100 mV ripple p-p
			12 VDC ± 5% – 200 mV ripple p-p
		DC Current	5 VDC – <800 mA typical, < 1000 mA maximum
			12 VDC – < 870 mA typical
	Audio Output Level	0.7 Vrms (typical)	
	Configuration Jumper Block	Master, slave, and cable select modes	
	Data Interface Connector	40-pin, shrouded and keyed, flat ribbon	
	Environmental (all conditions non-condensing)	**Temperature** (operating)	41° to 122° F (5° to 50° C)
		Relative Humidity (operating)	10% to 85%
		Maximum Wet Bulb Temperature (operating)	86° F (30° C)
	Certifications, Approvals	MMC II support, multi-read certification, Microsoft WHQL certification, ACA AS/NZS 3548 class B, CNS 13438, C.I.S.P.R. Pub 22, TUV or VDE EN60950, EN 55022, EN55024, SEMKO, NEMKO, DEMKO, FIMKO, EN 60825-1, UL 60950, and CSA C22.2 60950-2000.	
16X/48X DVD-ROM Drive	**Height**	5.25-in, half-height	
	Interface Type	ATAPI	
	Dimensions– External, Excluding Bezel (W x H)	5.88 x 1.71 in (149.5 x 43.5 mm)	
	Disc Diameter	12 cm, 8 cm	
	Disc Thickness	1.2 mm	
	Track Pitch	1.6 µm (CD), 0.74 µm (DVD)	
	Disc Center Hole Diameter	15 mm	
	Disc Formats	DVD-ROM (single and dual layer); DVD-video; DVD-R version 1.0 and 2.0; DVD-RW version 1.0 and 1.1; DVD-R multi-border; DVD+RW; DVD+R, DVD+R DL ; CD-ROM Mode 1 and 2; CD-DA; CD-ROM XA Mode 2, Form 1 and 2; CD-extra; CD-text; CD-I Mode 2, Form 1 and 2; CD-I ready; video CD, CD-bridge; PhotoCD (single and multi-session); CD-R; CD-RW	
	Disc Capacity	**DVD-ROM**	4.7 GB (DVD-5), 8.54 GB (DVD-9), 9.4 GB (DVD-10), 3.95 GB (DVD-R version 1.0), 4.7 GB (DVD-R version 2.0), 4.7 GB (DVD-RW version 1.0 and 1.1), 4.7 GB (DVD+RW), 4.7G (DVD+R), 8.5 GB (DVD+R DL)
		CD-ROM	540 MB (Mode 1, 12 cm), 640 MB (Mode 2, 12 cm), 700 MB (80 minimum CD-R and CD-RW), 180 MB (8 cm)

Technical Specifications - Optical Storage

	Block Size (bytes)	DVD-ROM - 2048; CD-ROM Mode 0 - 2352; CD-ROM Mode 1 - 2352, 2340, 2336, 2048; CD-ROM Mode 2 - 2352, 2340, 2336, 2048	
	Access Times (typical reads, including settling)	**DVD-ROM Single Layer**	120 ms (typical)
		CD-ROM Mode 1	90 ms (typical)
		Full Stroke DVD	240 ms (seek) (typical)
		Full Stroke CD	160 ms (seek) (typical)
	Maximum Data Transfer Rates	**CD-ROM Read**	7200 KB/s (up to 48X)
		DVD-ROM Read	21,600 KB/s (16X) Max
	Data Transfer Modes	PIO Mode 4 (16.6 MB/s); Multi-word DMA mode 2 (16.6 MB/s); UltraDMA Mode 3 (44.4 MB/s)	
	Power	**Source**	Four-pin, DC power receptacle
		DC Power Requirement	5 VDC ± 5% – 100 mV ripple p-p
			12 VDC ± 5% – 200 mV ripple p-p
		DC Current	5 VDC – <800 mA typical, < 1000 mA maximum
			12 VDC – < 870 mA typical
	Audio Output Level	0.7 Vrms (typical)	
	Configuration Jumper Block	Master, slave, and cable select modes	
	Data Interface Connector	40-pin, shrouded and keyed, flat ribbon	
	Environmental (all conditions non-condensing)	**Temperature** (operating)	41° to 122° F (5° to 50° C)
		Relative Humidity (operating)	10% to 85%
		Maximum Wet Bulb Temperature (operating)	86° F (30° C)
	Certifications, Approvals	MMC II support, multi-read certification, Microsoft WHQL certification, ACA AS/NZS 3548 class B, CNS 13438, C.I.S.P.R. Pub 22, TUV or VDE EN60950, EN 55022, EN55024, SEMKO, NEMKO, DEMKO, FIMKO, EN 60825-1, UL 60950, and CSA C22.2 60950-2000.	

48X/32X/48X/16X Combo CD-RW/DVD-ROM	5.25-inch, half-height, tray-load		
	Color	Carbonite	
	Orientation	Either horizontal or vertical	
	Interface Type	ATAPI	
	Dimensions (W x H x D)	5.77 x 1.71 x 7.36 in (146.5 x 43.5 x 187 mm) (external, excluding bezel)	
	Disc Diameter	12 cm, 8 cm	
	Disc Thickness	0.05 in (1.2 mm)	
	Track Pitch	1.6 um (CD), 0.74 um (DVD)	
	Disc Center Hole Diameter	0.6 in (15 mm)	
	Reference Scanning Velocity	1.2 m/s (CD); 3.49 m/s (DVD SL); 3.84 m/s (DVD DL)	
	Read Only Disc	**Formats and Modes**	CD-ROM – Mode 1; CD-ROM XA-Mode 2 (forms 1

Technical Specifications - Optical Storage

Parameters	**Supported**	and 2); CD-Bridge; CD digital audio; CD Extra; CD-I – Mode 2 (forms 1 and 2) and CD-I-Ready; Photo CD (single and multi-session); video CD; DVD (single- and double-layer); DVD-R; DVD-RW; DVD-RW Multi-Border; DVD+R; DVD+R Multi-Session , and DVD+RW
	Capacity	180 MB (mode 2, 8 cm); 540 MB (mode 1, 12 cm); 650 MB (mode 2, 12 cm); 700 MB (Mode 2, 12 cm); 4.7 GB (DVD-5); 8.54 GB (DVD-9); 9.4 GB (DVD-10)
	Block Size	Mode 1 – 2,048 and 2,352 bytes; mode 2, form 1 – 2,048; 2,328; 2,336; 2,340 and 2,352 bytes; mode 2, form 2 – 2,328; 2,336; 2,340 and 2,352 bytes; CD-DA – 2,352 bytes; DVD-2,048 bytes
Writeable Disc Parameters	**Disc Type**	CD-R and CD-RW
	Write Methods	Disc at Once, Track at Once, Session at Once, Variable Packet, Fixed Packet
	Format and Modes Supported	CD-ROM (mode 1); CD-ROM XA (mode 2, forms 1 and 2); CD digital audio, CD-I (mode 2, forms 1 and 2); video CD; CD-Bridge; Video CD
	Capacity	180 MB (mode 2, 8 cm); 540 MB (mode 1, 12 cm); 650 MB (mode 2, 12 cm); 700 MB (mode 2, 12 cm)
	Block Size	CD-DA – 2,352 bytes; mode 0 – 2,336 and 2,352 bytes; mode 1 – 2,048 and 2,352 bytes; mode 2 – 2,336 and 2,352; mode 2, form 1 – 1,048 and 2,352 bytes; mode 2, form 2 – 2,324 and 2,352 bytes
Access Times (typical reads, including settling)	**Random DVD**	< 140 ms (typical)
	Random CD	< 125 ms, (typical)
	Full Stroke DVD	< 250 ms (seek)
	Full Stroke CD	< 210 ms (seek)
Maximum Data Transfer Rates	**CD-R write**	7200 KB/s (48X) Max
	CD-RW write	1500 KB/s (10X) Max
	CD-ROM, CD-R, CD-RW read	7200 KB/s (48X) Max
	DVD ROM read	21,632 KB/s (16X) Max
Data Transfer Modes	ATA PIO mode 4 (16.7 MB/s); ATA Multi-word DMA mode 2 (16.7 MB/s); ATA UltraDMA mode 0 (16.7 MB/s); ATA UltraDMA mode 1 (24 MB/s), mode 2 (33 MB/s); ATA UltraDMA Mode 3 44 Mbytes/s (default)	
	Cache Buffer	2 MB (minimum)
	Startup Time (single)	< 7 seconds (typical)
	Startup Time (multi-session)	< 30 seconds (typical)
	Stop Time	< 4 seconds
Power	**Source**	Four-pin, DC power receptacle

Technical Specifications - Optical Storage

		DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p 12 VDC ± 5%-200 mV ripple p-p
		DC Current	5 VDC (< 1000 mA typical, < 1600 mA maximum) 12 VDC (< 600 mA typical, < 1400 mA maximum)
		Total Drive Power (standby mode)	< 2.5 Watt
	Audio Output Level	0.7 Vrms (typical)	
	Configuration Jumper Block	Master, slave, and cable select modes	
	Data Interface Connector	40-pin, shrouded and keyed, flat ribbon	
	Environmental (all conditions non-condensing)	**Temperature** (operating)	41° to 122° F (5° to 50° C)
		Relative humidity (operating)	10% to 90%
		Maximum wet bulb temperature (operating)	86° F (30° C)
	Certifications, Requirements	MPC-3 compliant, multi-read requirements, ACA AS/NZS 3548, ANSI C63.4-1992, ATAPI Spec SFF-8020, ATA Spec X3T9.2, CB Bulletin No. 92A, CSA C22.2 No. 950-1995, C.I.S.P.R. Pub 22, EMKO-TSE 207/94, TUV or VDE EN60 950, EN60825-1, Microsoft PC2001 certification, Microsoft Logo for Windows XP, 2000, and NT4	

16X DVD+/-RW Drive	5.25-inch, half-height, tray-load		
	Orientation	Either horizontal or vertical	
	Interface type	ATAPI/EIDE	
	Disc recording capacity	8.5 GB DL or 4.7 GB standard	
	Dimensions (W x H x D)	5.9 x 1.7 x 8.0 in (15.0 x 4.4 x 20.3 cm)	
	Weight (max)	2.6 lb (1.2 kg)	
	Write speed	DVD+R	Up to 16X
		DVD+RW	Up to 4X
		DVD+R DL	Up to 2.4X
		DVD-R	Up to 8X
		DVD-RW	Up to 4X
		CD-R	Up to 40X
		CD-RW	Up to 24X
	Reads	DVD+R/-R/+RW/-RW	Up to 16X
		DVD-ROM	Up to 16X
		CD-R/RW	Up to 40X
	Access time (typical reads, including settling)	**Random**	DVD: < 130 ms (typical), CD: < 120 ms (typical)
		Full Stroke	DVD: < 240 ms (seek), CD: < 200 ms (seek)
		Startup Time	Single-session: < 7 seconds (typical), Multi-session: < 30 seconds (typical)
		Stop Time	< 4 seconds

Technical Specifications - Optical Storage

		Cache Buffer	2 MB (minimum)
		Data Transfer Modes	ATA PIO mode 4 (16.7 MB/s); ATA Multi-word DMA mode 2 (16.7 MB/s); ATA UltraDMA Mode 3 (44.4 MB/s -default)
	Power	**Source**	Four-pin, DC power receptacle
		DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p
			12 VDC ± 5%-200 mV ripple p-p
		DC Current	5 VDC (< 1000 mA typical, 1600 mA maximum)
			12 VDC (< 600 mA typical, 1400 mA maximum)
		Total Drive Power (standby mode)	< 2.5 Watt
	Audio output	**Line-Out**	0.7 VRMS
		Signal-to-noise ratio	74 dB
		Channel separation	65 dB
	Operating environmental (all conditions non-condensing)	**Temperature**	41° to 122° F (5° to 50° C)
		Relative humidity	10% to 90%
		Maximum wet bulb temperature	86° F (30° C)
	System configuration	Intel Pentium III Processor or later with 128 MB of memory (required); 256 MB recommended 2-D or 3-D graphics cards on primary disk drive for operating system and application software; second disk drive for audio and video data	
	Regulatory approvals	MPC-3 compliant, multi-read requirements, ATA Spec X3T9.2, ATAPI Spec T13.1153D, ANSI C63.4-1992, UL 1950, ACA AS/NZS 3548, CB Bulletin No. 96A, CSA C22.2 No. 950-1995, CFR 47 C.I.S.P.R. Pub 22 Class B, DHHS/FDA, EMKO-TSE 07/94, TUV EN60950, EN60825-1, MIC, BSMI-CNS 13438, CE, Microsoft PC2001 certification, Microsoft Logo for Windows XP and 2000.	

16X DVD+/-RW LightScribe Drive (Double Layer / Dual Format)	**Height**	5.25-inch, half-height, tray-load	
	Orientation	Either horizontal or vertical	
	Interface type	ATAPI/EIDE	
	Disc recording capacity	8.5 GB DL or 4.7 GB standard	
	Dimensions (W x H x D)	5.9 x 1.7 x 8.0 in (15.0 x 4.4 x 20.3 cm)	
	Weight (max)	2.6 lb (1.2 kg)	
	Write speed	DVD+R	Up to 16X
		DVD+RW	Up to 4X
		DVD+R DL	Up to 2.4X
		DVD-R	Up to 8X
		DVD-RW	Up to 4X
		CD-R	Up to 40X
		CD-RW	Up to 24X

Technical Specifications - Optical Storage

Read speed	DVD+R/-R/+RW/ -RW/+R DL	Up to 8X
	DVD-ROM	Up to 16X
	CD-ROM, CD-R	Up to 40X
	CD-RW	Up to 32X
Access time (typical reads, including settling)	**Random**	DVD: < 130 ms (typical), CD: < 120 ms (typical)
	Full Stroke	DVD: < 240 ms (seek), CD: < 200 ms (seek)
	Startup Time	Single-session: < 15 seconds (typical), Multi-session: < 30 seconds (typical)
	Stop Time	< 4 seconds
	Cache Buffer	2 MB (minimum)
	Data Transfer Modes	ATA PIO mode 4 (16.7 MB/s); ATA Multi-word DMA mode 2 (16.7 MB/s); ATA UltraDMA Mode 3 (44.4 MB/s -default)
Power	**Source**	Four-pin, DC power receptacle
	DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p
		12 VDC ± 5%-200 mV ripple p-p
	DC Current	5 VDC (< 1000 mA typical, 1600 mA maximum)
		12 VDC (< 600 mA typical, 1400 mA maximum)
	Total Drive Power (standby mode)	< 2.5 Watt
Audio output	**Line-Out**	0.7 VRMS
	Signal-to-Noise Ratio	74 dB
	Channel Separation	65 dB
Environmental conditions (operating - non-condensing)	**Temperature**	41° to 122° F (5° to 50° C)
	Relative humidity	10% to 90%
	Maximum wet bulb temperature	86° F (30° C)
System configuration	Intel Pentium III Processor or later with 128 MB of memory (required); 256 MB recommended 2-D or 3-D graphics cards on primary disk drive for operating system and application software; second disk drive for audio and video data	
Regulatory approvals	MPC-3 compliant, multi-read requirements, ATA Spec X3T9.2, ATAPI Spec T13.1153D, ANSI C63.4-1992, UL 1950, ACA AS/NZS 3548, CB Bulletin No. 96A, CSA C22.2 No. 950-1995, CFR 47 C.I.S.P.R. Pub 22 Class B, DHHS/FDA, EMKO-TSE 07/94, TUV EN60950, EN60825-1, MIC, BSMI-CNS 13438, CE, Microsoft PC2001 certification, Microsoft Logo for Windows XP and 2000.	

Technical Specifications - Removable Storage

HP Drive Key II	**Dimensions** (HxWxD)	0.32 x 0.63 x 2.67 in (0.8 x 1.6 x 6.8 cm)	
	Storage Capacity	256 MB	
	Weight	0.05 lb (0.02 kg)	
	Transfer Rates	Read	Capable of 6.0 MB/s sustained read speed in USB 2.0 system
		Write	Capable of 6.0 MB/s sustained write speed in USB 2.0 system
	Operating Temperature	41° to 122° F (5° to 50° C)	
	Non-operating Temperature	-22° to 140° F (-30° to 60° C)	
	Option Kit Contents	HP Drive Key II, documentation	

HP 16-in-1 Media Card Reader	**USB Interface**	USB 2.0 High-speed device	
	Advance protocol support	Supports hardware ECC (Error Correction Code) function • Supports hardware CRC (Cyclic Redundancy Check) function • Supports MS 4-bit parallel transfer mode • Supports MS-PRO 4-bit parallel transfer mode • Supports SD 4-bit parallel transfer mode • Supports high-speed 50-MHz SD 4-bit card (version 1.1) • Support high-speed 52-MHz MultiMediaCard 8-bit card	
	Supported media type with card adapter	• MicroSD (T-Flash) • Memory Stick Micro	
	Mechanical		
	Environmental	**Operational Environmental Extremes**	Test Parameters/Conditions – Power applied, unit operating on system ±5% nominal supply voltage. 10°C 10% R.H. = 24 hours 10°C 90% R.H. = 24 hours 20°C 90% R.H. = 24 hours 30°C 90% R.H. = 24 hours 40°C 90% R.H. = 24 hours 50°C 90% R.H. = 24 hours 50°C 10% R.H. = 24 hours
		Storage Environmental Extremes	Test Parameters/Conditions 60°C @ 80% R.H. for 96 hours -30°C @ 20% R.H. for 48 hours No power applied Delta °C < 1.0°C/min Delta % R.H. < 1.5% R.H./min
	Approvals	USB-IF, WHQL, Compliant with USB Mass Storage Class Bulk only Transport Specification Rev. 1.0, Compliant Intel Front Panel I/O Connectivity Design Guide V. 1.2 FCC, CE, BSMI, C-Tick, VCCI, MIC, cUL, TUV-T	

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